

Notice of Allowability

Application No.

09/640,754

Applicant(s)

KIM ET AL.

Examiner

Art Unit

Hsien-Ming Lee

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 10/1/03.
2. ☒ The allowed claim(s) is/are 2-7,9,10,14,15 and 21-23.
3. ☒ The drawings filed on 18 August 2000 are accepted by the Examiner.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the.
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
 - * Certified copies not received: _____.
5. ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
 - (a) ☐ The translation of the foreign language provisional application has been received.
6. ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application. **THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

7. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
8. ☐ CORRECTED DRAWINGS must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No. _____.
 - (b) ☐ including changes required by the proposed drawing correction filed _____, which has been approved by the Examiner.
 - (c) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No. _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet.

9. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- 1 ☐ Notice of References Cited (PTO-892)
- 3 ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 5 ☐ Information Disclosure Statements (PTO-1449), Paper No. _____.
- 7 ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
- 2 ☐ Notice of Informal Patent Application (PTO-152)
- 4 ☒ Interview Summary (PTO-413), Paper No. 102003.
- 6 ☒ Examiner's Amendment/Comment
- 8 ☒ Examiner's Statement of Reasons for Allowance
- 9 ☐ Other

DETAILED ACTION

Remarks

1. Applicants' cancellation to claim 8 is acknowledged.
2. Claims 2-7, 9, 10, 14, 15 and 21-23 are pending in the application.
3. The Amendment after Final has been entered.
4. The Final rejection is withdrawn.

Examiner's Amendment

5. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Kenneth D. Springer (Reg. No. 39,843) on Oct. 20, 2003.

6. The application has been amended as follows:

In claim 2, at line 3, replace "at the top of " with – at **a** top of --.

In claim 4 (line 3), claim 5 (line 3), claim 22 (line 4) and claim 23 (line 4), replace " the cross-sectional area" with -- **a** cross-sectional area --.

In claim 6 (line 2), claim 7 (line 2), replace "before the conductive line is etched" with – before **etching** the conductive line --.

In claim 10, at line 1, replace" wherein the of " with – wherein **a** step of --.

In claim 10, at line 5, replace "the critical dimension" with – **a** critical dimension --.

In claim 14, at lines 2-3, replace "after the portion of the conductive line defining the gap therein is exposed" with -- after **exposing** the portion of the conductive line defining the gap therein --.

Allowable Subject Matter

7. Claims 2-7, 9, 10, 14, 15 and 21-23 are allowed.

8. The following is an examiner's statement of reasons for allowance:

The closest prior art of record, Teo to US 5,895,264, teaches a method of fabricating semiconductor devices, comprising:

- forming a conductive region 11 at the top of a semiconductor substrate 10 (Fig. 1);
- forming a first interlayer dielectric layer 12 on the semiconductor substrate 10 over the entirety of the conductive region 11 (Fig. 1);
- forming a conductive line 13, which is to be connected to the conductive region 11, on the first interlayer dielectric layer 12, the conductive line 13 having a gap therein of a predetermined width (Fig. 1);
- forming a second interlayer dielectric layer 14 on the conductive line 13 such that a first portion of the second interlayer dielectric layer 14 occupies the gap in the conductive line 13 (Fig. 1);
- removing a portion of the first interlayer dielectric layer 12 overlying the conductive region 11, the first portion of the second interlayer dielectric layer 14 and a second portion of the second interlayer dielectric layer 14 to form a contact hole 18 (Fig. 3); and

- filling the contact hole 18 with a conductive material 19 to connect the conductive line 13 to the conductive region 11 (Fig.4).

In contrast, Teo neither teaches nor suggests removing the first portion of the second interlayer dielectric layer *occupying the gap in the conductive line* and a second portion of the second interlayer dielectric layer *overlying the gap* to form the contact hole, wherein the contact hole is for filling the conductive material, which would connect the conductive line and the conductive region; and the patterned photosensitive film defining *an opening therein having a width that is greater than* the width of the conductive line.

Therefore, the instant application is deemed to be directed a nonobvious improvement over the invention patented in U.S. Pat. No. 5,985,264. The improvement at least comprises forming a patterned photosensitive film defining *an opening therein having a width that is greater than* the width of the conductive line; etching the conductive line and the first interlayer dielectric layer using the etched second interlayer dielectric layer as a etch mask (claim 2); and etching the first portion of the second interlayer dielectric layer *occupying the gap* in the conductive line, and the portion of the first interlayer dielectric layer *underlying the gap*, using the etched second interlayer dielectric layer and *the portion of the conductive line defining the gap as etch masks* (claim 21).

With the aforementioned patentably distinct features, the instant invention provide an effective means for forming a precise contact hole for damascene structure.

9. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue

fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hsien-Ming Lee whose telephone number is 703-305-7341. The examiner can normally be reached on M-F (9:00 ~ 5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone number for the organization where this application or proceeding is assigned is (703) 308-7382.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Hsien-Ming Lee
Examiner
Art Unit 2823

Oct. 20, 2003

A handwritten signature in black ink, appearing to read "Hsien-Ming Lee", with a long horizontal flourish extending to the right.